

of these cases, although many successful operations have been recorded by others over a period of years. In our opinion the extent of parenchymal invasion is difficult to ascertain grossly, the urine examination from the apparently normal pelvis often misleading, especially in cases of the incomplete or branched type. It is granted that the operation of hemi-nephrectomy is ideal for the purpose of conserving kidney tissue in the presence of some lesion in the opposite kidney. In our operative series, 6 cases involved the right kidney and 7 the left. Three were in males and ten in females. The incomplete bifurcations in the upper third were twice as many as the branchings in the middle and lower thirds. In the whole series we have found the lower pelvis more than twice as often involved in some lesion than the upper. On the other hand, we have had no supernumerary ureters with an ectopic opening. It is a recognized fact that in these cases it is the upper pelvis that is the seat of infection and hydronephrosis.

In the small series reported we naturally cannot offer figures of statistical value, many well recognized lesions not being encountered.

In concluding, we may say that the treatment as far as the double ureter is concerned is really the treatment of the accompanying surgical lesion. For the ectopic supernumerary ureter, complete or partial ureterectomy with nephrectomy or hemi-nephrectomy as the conditions indicate.

I wish to extend my thanks to Dr. David W. MacKenzie for his permission to report these cases, and to Mrs. H. H. Cheney for her excellent illustrations.

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FURTHER HISTORY OF THE CARE AND FEEDING OF THE DIONNE QUINTUPLETS*

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THE details of the birth of these infants and their immediate care have already been recorded.† To that report I would like to add some further history of the care and feeding up to the age of ten months.

Shortly after birth, when the babies were breathing and emitting little mewling cries, they were wrapped up in the only coverings available, placed on the bed, and covered with a heated blanket. Soon after this a laundry basket was obtained, and the babies were carefully tucked in this and kept warm by blankets heated in the oven. Later on in the day the nurse brought with her the first hot water bottle we used. On the third day an incubator was presented to us, and the three smallest infants were transferred to this. Within a week, a second incubator was obtained and then, finally, three more were

secured, so that a separate one was available for each. The first incubator was made with a hollow frame, a glass hinged top, and fitted with a thermometer and a sponge holder. It was heated with hot water in a copper tank. The other incubators were ingeniously constructed and patterned after an old picture of Tarnier's, as shown in Cook's Obstetrics. The second type of incubators were heated by earthenware containers, which are known in the country as "little pigs". It was necessary at this time to employ an orderly, and his whole time was spent in keeping the fire going in the cook stove, maintaining the proper temperature of the water in the incubator containers, and helping with the washing. The temperature of the incubators was kept between 87 and 90° F. for the first few days, but as time went on this was gradually lowered and maintained at 84° F. The humidity within the incubators was measured and kept between 50 and 55° by the use of sponges soaked in hot water.

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† A. R. Dafoe, *J. Am. M. Ass.*, 1934, **103**: 673.

A room next to the mother's bedroom was cleared and made into a nursery. By the end of the fifth day we had three graduate nurses, a cook-general, and an orderly, and for the first time we had a breathing spell. This gave us an opportunity to prepare plans for the protection of the babies and to obtain the necessary equipment for their care.

The babies were born about two months before full term and presented the typical appearance of premature infants, being bluish black in colour, with bulging foreheads, small faces, wrinkled skin and no subcutaneous tissue, enlarged soft "tummies", flaccid muscles, and spider-like limbs. At times the breathing would almost stop, then pick up and race along above the normal rate. For days it seemed impossible that the tiny spark of life in each of their bodies would prove sufficient to produce a continuous functioning of the various systems in the body machine. The babies had to be watched every minute and stimulated frequently, to arouse them out of their attacks of cyanosis and dyspnoea. Within the first week cylinders containing oxygen 95 per cent, carbon dioxide 5 per cent, and fitted with a reducing valve and ordinary inhalator were obtained. This gas mixture replaced all other methods of stimulation. It was a most valuable measure in relieving the attacks of respiratory distress. The inhalators were given as an *apéritif* a few minutes before feeding time in the early days and with every attack of dyspnoea and cyanosis. It was most interesting and very satisfying to watch how the gas would stir up these torpid little babies and produce an energetic sucking from the Breck feeders. We used the gas mixture until the babies were three months old, and altogether depleted 14 cylinders, each one of which contained 80 gallons.

The babies were kept in the incubators until they all reached the weight of six pounds. For the first two months they were removed once a day only, in order that they might be oiled. At the end of this time, the oil bath was changed to a soap and water one. When they were five pounds in weight the incubators were used as cots and the extra heating was stopped.

In the early fall (1934) each baby in turn developed very quickly, a severe type of intestinal toxæmia as shown by high temperature, rapid pulse, abdominal distension and diarrhoea,

and they gave me many anxious moments. (An investigation showed that the most probable source of this infection was the diapers, which were improperly sterilized.) The anæmia, which was present before to some extent, became more marked and small doses of ferrous chloride were given three times a day in their feedings. This iron mixture was kept up until they were one year old. At the same time preparations were carried out for possible blood transfusions. The babies' bloods were typed (found to be all Jansky No. I) and prospective donors were found. Hospitals offer a much greater freedom in the matter of transfusions than do country homes, and this home, with its many local and racial prejudices, was no exception to this statement. Fortunately it was not necessary to carry out this procedure.

The opening of the hospital on September 22, 1934, marked one of the most important events in the history of the babies. It gave me the first opportunity for unrestricted medical control (with its various ramifications in this case) in the care of the babies.

Everyone realizes, I am sure, the difficulties that any family would have in adjusting themselves to a situation that the birth and survival of quintuplets produced. The Dionne house was a representative home of the backwoods, and, of course, offered the usual limited facilities of that country. The routine of family life was shattered by the various duties carried out by the three nurses, orderly and cook, which were necessary for the welfare of the babies. It was quite natural, therefore, that the family should find the whole situation very bewildering. Furthermore, we found that proper isolation measures were impossible to carry out in the home, and black flies, mosquitoes and other insect visitors evaded our vigilance. Proper food and rest for the nurses, and protection from the curious public were amongst our other problems. All of these troubles ended, however, when the babies were transferred to their new residence, which is situated about 100 yards across the road from their house of birth. It contains a large, bright, well equipped nursery, four bedrooms, a bath-room, dining room and kitchen. This hospital is supplied with electricity and contains all the conveniences and equipment which is necessary to maintain a modern infants' home. The personnel of the staff remained the same. Dur-

ing the summer just past a considerable number of changes in the building have been made. An isolation ward, an extra bathroom, and a sun-room have been added, and we feel that these additions will increase the efficiency of our care for the children.

After the babies arrived at the hospital they were introduced for the first time in their lives to the northern sun and the invigorating outdoor air. Commencing gradually, they soon began to spend hours under warm wrappings on the veranda, in the fresh air, and this was continued throughout the winter months. They immediately began to show a definite improvement; their faces filled out, their eyes sparkled, their legs became straight and plump, their "tum-mies" developed good proportions, and these happy little souls soon took on the rotund appearance of little puppies. Their normal development has been continuous ever since, and I know of no greater treat in the world than the one I receive when I enter the quintuplets' nursery every morning and see such a rare collection of smiling healthy babies.

In the country where I live, physicians have a very limited chance to follow carefully the early care of infants. The grandmothers, mothers and midwives carry on with those duties shortly after the babies are born. We are usually only called for serious illnesses. The complete control of the care and feeding of the quintuplets gave to me the greatest pleasure of my life. I have no illusions about any special knowledge that I possess in the practice of pædiatrics, and therefore I have tried to take advantage, to the best of my ability, of the good results obtained in our research centres. I feel, however, that I have learned a great deal in the last year and a half regarding infant care. My education has been further augmented through the medium of an international correspondence course in Medicine, Pædiatrics, Bacteriology, and Therapeutics. My preceptors in this course have been varied, and included Christian Science followers, astrologers, chiropractors, veterinary surgeons, nurses, fathers, mothers, and maiden ladies. Many superstitious beliefs and ancient ideas regarding medicine and disease were passed along to me for my help. Letters containing advice and offers of help were received from Great Britain, India, Germany, France, Central America, Mexico, Australia, Philippine Islands, and from all

over North America. I am quite sure that every milk preparation either "in" or "off" the market was mentioned in some of the letters. Goats and prize cows were offered to provide the necessary milk for the babies, and wet nurses made application for dairy appointments. It was suggested that a healthy lactating Yorkshire sow would solve our feeding problems. Her milk could either be obtained by pumping, or else preparing a place in the house whereby the babies could be directly suckled. It was intimated that the sow could be trained to adapt herself to this maternal duty. The reported onset of intestinal toxæmia produced an avalanche of letters, all of which contained suggested measures of treatment. Watermelon juice, infusions of blackberry root, horsetail plant, sassafras and knot weed were said to have produced spectacular results in similar cases. Whiskey was a common ingredient of many suggested remedies, and was to be used both internally and externally. The use of spirits, however, produced several letters of criticism for starting the children at such a tender age on a downward path. Sheep's dung tea, sweetened and warmed, was offered as a cure for "The Blue Spells". Placental blood in warm water was another secret imparted to me, for use in saving the babies. Of course, the usual letters containing messages from the stars, dreams of kidnapping, and warnings against poisoned food were plentiful. A beauty specialist, in her own words, "a rather noted one", advised the use of her marvellous cream to remove the wrinkles from the premature babies. The contents of the morning mail offered great possibilities, and the following are two examples from amongst the interesting communications received:

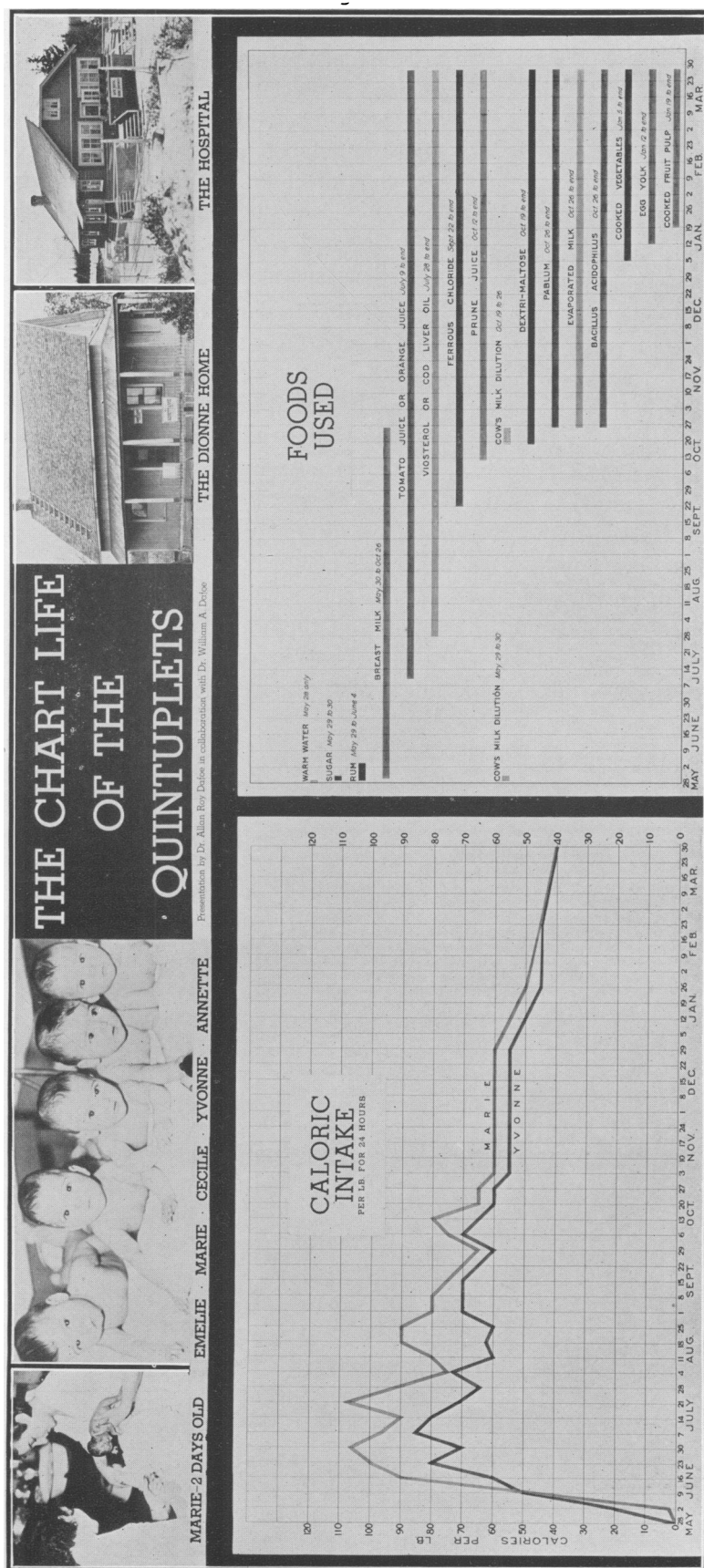
Dear Sir:

I notice by the evening paper that you are waiting on a lady who is mother of 5 girl babies. You sure have your hands full—What carries away babies is Diareh or summer complaint or looseness of the bowels—Now the best cure I know is perfectly harmless.

"Get pure Rye Whiskey and pour one teaspoon into a saucer. Take a clean pine sliver and set it on fire until it goes out. The dose for a medium sized baby (5-6 lbs) would be 1 drop, every 2 hrs. There ain't no poison in pure Rye Whiskey after it is burnt and I am anxious to see you pull through with them all. This is why I am putting you onto this cure.

(Signed)

CHART I.



Dear Dr..

Will you please send me any information on the Quintuplets of Mr. and Mrs. Dionne, of the past till the future time and any for the future, if it is not inconvenient to do so.

The Blank High School has requested for me to do this please.

Yours truly,

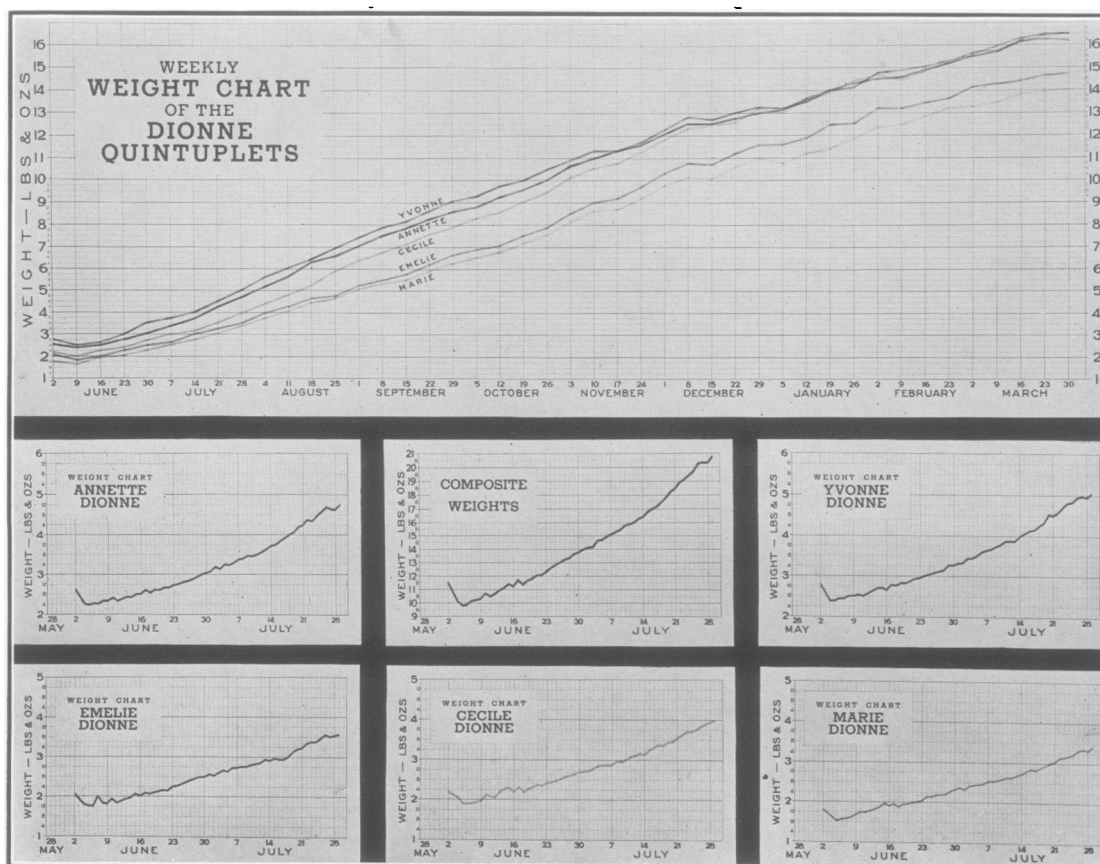
Feedings.—During the first day, the babies were fed on warm water with an eye dropper every 2 hours. It was only possible to get them to take about 10 to 15 drops at one time. On the second and third days they were given 30 to 60 drops of a mixture containing 7 ounces of milk, 13 ounces of water, and 1 ounce of corn syrup. The milk and water was brought to a boil and the corn syrup gradually stirred into the mixture. A few drops of rum were added to all the feedings for the first week. On the fourth day we were receiving enough mother's milk from The Hospital for Silk Children, Toronto, to meet all the necessary requirements. The amount of breast milk was gradually increased from a drachm per feeding upwards, but the babies

were three weeks old before they were able to take one ounce per feeding. The breast milk was used from the first at full strength, and it remained as the entire source of milk supply until the babies were nearly four months old. The daily supply of milk increased from 30 ounces per day in the first two weeks to nearly a gallon by the end of the fifth month. We managed to keep a small reserve supply in the refrigerator for emergencies.

A Breck feeder was substituted for the eye dropper on the sixth day, and at two months of age the babies were all taking their food from an ordinary feeding bottle. The feeding intervals were gradually increased, but with frequent setbacks, until at ten months the babies were fed four times a day.

The accompanying chart shows the caloric intake per pound in 24 hours of the smallest baby, Marie, and the heaviest, Yvonne. The caloric intakes of the other three ranged between these graphs, but in order to prevent confusion of lines they are not shown. At the end of two

CHART II.



weeks the babies were receiving 50 calories per pound per day. From that time on the smallest baby, as was to be expected, received more, and the intake level remained consistently above, but it gradually approached the others, until at 10 months of age the lines coincided at 50 calories per pound. This common level was also reached by the other three babies at this time. This amount of 40 calories represents the amount usually required for normal infants over 6 months of age.

The breast milk was changed on October 19th to a mixture of cow's milk, water and Dextro-Maltose. We only used the cow's milk for a few days because we couldn't depend upon it, and an evaporated milk was substituted for it. This formula, with the addition of lacto-bacillus acidophilus, was used until the infants were one year old. The *B. acidophilus* appeared to keep the bowel movements more regular and the stools normal in odour. From one-half to one ounce of tomato juice or orange juice was administered daily as an anti-scorbutic to each baby, starting on July 9th. Later the orange juice was increased to 3 to 4 ounces per baby and used thus for its cathartic value as well as for its vitamin C content.

On July 28th, when the infants were two months of age, vitamin D was given daily, first in the form of viosterol and then of cod liver oil. At the end of ten months each of the babies were receiving two drachms of cod liver oil per day. Prune juice was given from October 12th. The first solid food was used on October 26th in the form of "Pablum", a pre-cooked base-forming cereal, and this was given daily from this date. Assorted vegetables, cooked and strained, were added on January 5th, followed by egg yolk on January 12th, and on January 19th by cooked fruit pulp (apples, apricots, prunes).

Weight record.—On May 29th (2nd day of life) the combined weight of the babies was 13 pounds 6 ounces, but on June 4th the total weight of the five was less than ten pounds, and Marie weighed only one and one-half pounds. The weekly weight charts for the first ten months present a very steady upward trend, with the two smaller babies showing a somewhat

slower rate of gain. After ten months the weights continued to increase, so that at one year each had gained about one pound over her weight at ten months.

Infection.—Every care has been taken to prevent exposure of these babies to infection. Almost the only people in direct contact with the babies have been the parents, the nurses and myself. Gowns and masks are used by all the attendants. In spite of these precautions, each of the babies during the month of March, 1935, developed an upper respiratory tract infection which extended to the ears. It was necessary to perform paracentesis on both the ear drums of little Marie. They all recovered somewhat slowly without further complications.

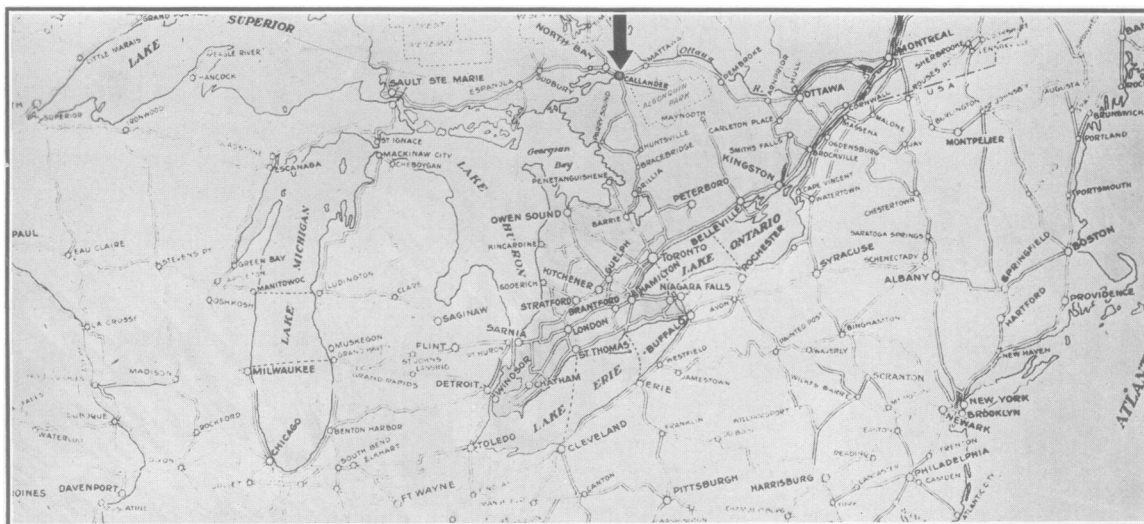
The hæmangioma on Marie's thigh required during the year three doses of radium emanations before it was completely obliterated.

The accompanying charts present in a graphic form the salient features, from a scientific standpoint as well as from a general interest standpoint, in the care and feeding of the Dionne quintuplets from birth to the age of ten months. These charts were exhibited at the international conference of the Canadian and American Associations in Atlantic City in June, 1935. My brother and myself have presented them to the Ontario Government as a permanent record of the essential details concerned with the growth of the quintuplets during their first year of life.

The many incidents associated with the birth, the survival, and the growth of the Dionne quintuplets rivals to my mind even the imaginative fantasies of Scheherazade as told in some of her life-saving stories in "The Thousand and One Nights". In looking backwards at the end of the first year of these babies' lives, I feel that their history portrays a modern fairy tale with a medical flavour. This medical fairy tale, however, differs from the make believe ones, because it is a true story of five babies who were actually born in rags but who have even in their short lives achieved riches.

I wish to express my appreciation for the very real help and constant advice in the care of these babies from my brother Dr. William A. Dafoe. Without his assistance it would have been impossible for me to keep the necessary records and to prepare the charts and manuscript which comprise this report.

CHART III.



CALLANDER ON THE MAP

INCIDENTS IN A MEDICAL FAIRY TALE

(In the last 500 years, there have been 33 cases of quintuplets authentically recorded — of these one group of five lived for 50 minutes and one out of another group survived for 50 days.)

BIRTH

A "Hurry up" Call to the Dionne home at 4.00 a.m. on May 28th, 1934, marked the beginning of a visit which resulted in the commencement of this fairy tale. The mother was suffering from pre-eclampsia and did not expect to be confined for two more months. On arrival at the home two babies were born, a third arriving, and that one was followed in a few minutes by two more.

It seemed impossible that all or even any of these babies would survive, but they were wrapped up in the only available coverings and kept as warm as possible. There was only one placenta.

The early struggle for the continued existence of these babies was intense, and the anxiety great. (There have been many other cares and worries associated with the survival and growth of these babies, due to the world-wide publicity which they have received.)

TEMPORARY GUARDIANSHIP

Towards the end of July, 1934 — a temporary guardianship board was appointed by the government, with the consent of the parents, to circumvent certain exploitation plans.

HOSPITAL RECEPTION

On September 22, 1934, the five babies were removed to their new hospital home, where details of infant care could be properly carried out. There was a decided improvement in their general health following this move.

Since that, there has been a normal progress in their physical and mental growth. With the exception of an upper respiratory tract and middle ear infection, they have been free from all other ailments.

WARDS OF THE CROWN

In March, 1935, The Dionne Quintuplets Guardianship Act was

passed by The Ontario Government which made The Dionne Quintuplets Special Wards of The Crown.

AT ONE YEAR

At one year of age, the babies are healthy and happy; their skin is tanned, their muscles firm and their bones well proportioned. In physical appearance they resemble one another closely, but not so in temperament. A scientific psychological study has commenced and will be carried on in the future. This investigation shows all the babies to be "at age" intellectually and developmentally, with the larger two slightly above.

THE FUTURE?

It would indeed be a wise man who could tell what the future has in store for these babies. Every effort will be made to keep them healthy and surround them in their growth period with the best traditions of their race, their religion, and their country.

The noblest of beings is man, and the meanest a dog; but intelligent persons agree that a grateful dog is better than an ungrateful man. A dog never forgets a morsel received, though thou throwest a stone at him a hundred times, but if thou cherishest a base fellow a lifetime, he will for a trifle suddenly fight with thee.—*Marim LXXXVII* of the Sheik Sa'di of Shiraz.

Although a Sultan's garment of honour is dear, yet one's own old robe is more dear; and though the food of a great man may be delicious, the broken crumbs of one's own sack are more delicious. Vinegar by one's own labour, and vegetables, are better than bread received as alms, and veal.—*Marim LXXXVII* of the Sheik Sa'di of Shiraz.